

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

1-3. (Canceled)

4. (Currently amended) ~~The A displacement correction apparatus of claim 1, wherein the displacement information calculating unit comprises:~~ comprising:

a curvature information storage unit configured to store curvature information of a reticle;

a first insertion module configured to insert ~~coefficients~~ coefficients into a curved surface approximating polynomial of the reticle based on the curvature information;

[[and]]

a first displacement information calculation module configured to calculate [[the]] displacement generated in the reticle ~~being flattened~~ being fixed on a reticle stage of an exposure apparatus based on the curved surface approximating polynomial of the reticle; and

a correction information calculation unit configured to calculate correction information correcting a projection lens of the exposure apparatus based on the displacement.

5. (Currently amended) ~~The A displacement correction apparatus of claim 1, wherein the correction information calculation unit comprises:~~ comprising:

a curvature information storage unit configured to store curvature information of a reticle;

a displacement information calculation unit configured to calculate displacement generated in the reticle being fixed on a reticle stage of an exposure apparatus based on the curvature information;

a coefficient calculation module configured to calculate ~~a coefficient~~ coefficients of a displacement correction polynomial ~~[[for]]~~ correcting a projection lens of the exposure apparatus based on the displacement; and~~[[,]]~~

a correction information calculation module configured to calculate ~~[[the]]~~ correction information correcting the projection lens based on the ~~coefficient~~ coefficients of the displacement correction polynomial.

6. (Cancelled)

7. (Currently amended) ~~The A~~ displacement correction apparatus of claim 6, ~~wherein the displacement information calculation unit comprises: comprising:~~

a curvature information storage unit configured to store a first height measured between a surface of a reticle and a first reference plane set for the reticle and a position coordinate on a surface of the reticle at which the first height is measured;

a height calculation module configured to calculate a third height~~[[,]]~~ by subtracting a second height measured between a surface of ~~[the]~~ a reticle stage of an exposure apparatus and a second reference plane set for the reticle stage from the first height~~[[,]]~~;

a second insertion module configured to insert coefficients into a curved surface approximating polynomial of the reticle by considering the flatness of the reticle stage, using the third height and a position coordinate on the surface of the reticle stage at which the first and second heights are measured; ~~[[and,]]~~

a second displacement information calculation module configured to calculate ~~the displacement generated in a changed shape of the reticle when adhered to the reticle stage~~ generated in the reticle being fixed on the reticle stage, using a curved surface approximating polynomial of the reticle ~~[[taken]]~~ taking the flatness of the reticle stage into consideration; and

a correction information calculation unit configured to calculate correction information correcting a projection lens of the exposure apparatus based on the displacement.

8-10. (Cancelled)

11. (Currently amended) ~~The~~ An exposure system of claim 8, ~~wherein the displacement information calculation unit comprises:~~ comprising:

an exposure apparatus; and

a displacement correction apparatus, comprising

a curvature information storage unit configured to store curvature information of a reticle,

a first insertion module configured to insert coefficients into a curved surface approximating polynomial of the reticle based on the curvature information; and

a first displacement information calculation module configured to calculate ~~[[the]] displacement generated in the reticle being flattened~~ generated in the reticle being fixed on a reticle stage of an exposure apparatus based on the curved surface approximating polynomial of the reticle; and

a correction information calculation unit configured to calculate correction information correcting a projection lens of the exposure apparatus based on the displacement.

12. (Currently amended) ~~The An exposure system of claim 8, wherein the correction information calculation unit comprises:~~ comprising:

an exposure apparatus; and

a displacement correction apparatus, comprising

a curvature information storage unit configured to store curvature information of a reticle;

a displacement information calculation unit configured to calculate displacement generated in the reticle being fixed on a reticle stage of an exposure apparatus based on the curvature information;

a coefficient calculation module configured to calculate coefficients of a displacement correction polynomial ~~[[for]]~~ correcting a projection lens of the exposure apparatus based on the displacement; and~~[[,]]~~

a correction information calculation module configured to calculate [[the]] correction information correcting the projection lens based on the coefficients of the displacement correction polynomial.

13. (Cancelled)

14. (Currently amended) ~~The~~ An exposure system of claim 13, wherein the ~~displacement information calculation unit comprises:~~ comprising:

an exposure apparatus; and

a displacement correction apparatus comprising:

a curvature information storage unit configured to store information of a first height measured between a surface of a reticle and a first reference plane and a position coordinate on a surface of the reticle at which the first height is measured;

a height calculation module configured to calculate a third height, subtracting a second height measured between a surface of [[the]] a reticle stage of an exposure apparatus and a second reference plane set for the reticle stage from the first height[[.]];

a second insertion module configured to insert coefficients into a curved surface approximating polynomial of the reticle by considering the flatness of the reticle stage, using the third height and a position coordinate on the surface of the reticle stage at which the first and second heights are measured; [[and,]]

a second displacement information calculation module configured to calculate ~~[[the]]~~ displacement ~~generated in a changed shape of the reticle when adhered to the reticle stage~~ generated in the reticle being fixed on the reticle stage, using a curved surface approximating polynomial of the reticle ~~[[taken]]~~taking the flatness of the reticle stage into consideration; and
a correction information calculation unit configured to calculate correction information correcting a projection lens of the exposure apparatus based on the displacement.

15-16. (Cancelled)

17. (Currently amended) ~~The~~ An exposure method ~~of claim 15, wherein the calculating the displacement comprises; comprising:~~
measuring curvature information of a reticle;
inserting coefficients into a curved surface approximating polynomial of the reticle based on the curvature information; ~~[[and]]~~
calculating ~~[[the]]~~ a displacement generated in the reticle ~~being flattened~~ being fixed on a reticle stage of an exposure apparatus based on the curved surface approximating polynomial of the reticle;
calculating correction information correcting projection lens of the exposure apparatus, using the displacement;
correcting the projection lens by using the correction information; and

exposing the reticle fixed on the reticle stage to a wafer, using the projection lens corrected.

18. (Cancelled)

19. (Currently amended) ~~The~~ An exposure method ~~of claim 18, wherein~~
~~calculating the displacement comprising, comprising:~~

measuring a first height between a surface of a reticle and a first reference plane
set for the reticle and a position coordinate on a surface of the reticle at which the first
height is measured;

calculating a third height~~[[,]]~~ by subtracting a second height measured from a
surface of ~~[[the]]~~ a reticle stage of an exposure apparatus and a second reference plane
set for the reticle stage from the first height~~[[,]]~~;

inserting coefficients into a curved surface approximating polynomial of the reticle
by considering the flatness of the reticle stage, using the third height and a position
coordinate on the surface of the reticle stage measured at which the first and second
heights are measured; ~~[[and,]]~~

calculating ~~[[the]]~~ displacement generated in a changed shape of the reticle ~~when~~
~~adhered to the reticle stage~~ being fixed on the reticle stage, using a curved surface
approximating polynomial of the reticle ~~[[taken]]~~ taking the flatness of the reticle stage
into consideration;

calculating correction information correcting projection lens of the exposure
apparatus, using the displacement;

correcting the projection lens by using the correction information; and
exposing the reticle fixed on the reticle stage to a wafer, using the projection lens
corrected.

20. (Currently amended) A computer program product, embedded in a
tangible medium, for executing an application on a displacement correction apparatus,
the computer program product comprising:

instructions for reading curvature information of a reticle from a curvature
information storage unit;

~~instructions for calculating displacement generated in the reticle being fixed on a~~
~~reticle stage of an exposure apparatus, based on the curvature information;~~

instructions for inserting coefficients into a curved surface approximating
polynomial of the reticle based on the curvature information;

instructions for calculating displacement generated in the reticle being fixed on a
reticle stage of an exposure apparatus based on the curved surface approximating
polynomial of the reticle;

instructions for calculating correction information ~~[[for]]~~ correcting a projection
lens of the exposure apparatus, using the displacement; and

instructions for storing the correction information in a correction information
storage unit.